

MOBILETT Plus/ -E/ -M/ -HP

SP

Service

Repair Instructions

Replacement of lower arm link

Kit part No. 65 76 016

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Chapter	Page	Revision
All	All	01

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General

These instructions describe how to replace the lower arm link and the two arm supports on the MOBILETT. The lower arm link and the arm supports are part of the arm balancing system on the MOBILETT. A shaft with a bearing is force fit into the arm support. On the new replacement parts, the shaft is flush mounted in the arm support to prevent possible movement.

Training of customer support engineers

Due to the technology used in this equipment, setup, service and maintenance should be performed only by customer support engineers who have work authorization for the MOBILETT Plus.

Components included

The kit (part no. 65 76 016) contains the following parts:

Article	Quantity	Part no.
Lower arm link and arm supports	1	62 15 045
Belt	2	65 57 156
Piece of wood	1	65 64 236
Cable tie (medium)	8	60 89 577
Cable tie (small)	5	64 57 840
Repair Instructions (this document)	1	65 90 249

Tools / documents required

- Protective conductor meter
(e.g. "Safety Tester Bender UNIMET 1000 ST", part no. 51 38 727).
- Digital multimeter
(e.g. "Fluke 8060A", part no. 97 02 101)
- Open-end wrench, 24 mm
- Measure tape
- Slide Calliper
- Loctite 242
- Round-nosed pliers
- Service Instructions SPR8-220.061.01... for MOBILETT Plus HP
or
SPR8-215.898/061.01... for MOBILETT Plus/ -E/ -M

Time required

Approximately 5 hours for 1-2 customer support engineers.

NOTICE

Some steps require at least two technicians because of complicated operations. Some steps also require considerable force, and therefore has to be performed by at least two technicians.

Steps which require two technicians can be found in chapter 2 on pages 11, 12, 13, 20 and 22.

Safety information

Read all safety notes in the document Service Instructions and pay special attention to the notes below.

 WARNING

Never work with the system open if capacitor is charged and/or batteries connected. Life-threatening electric shock hazard exists.

Protective measures listed in the document Service Instructions must be performed.

The arm system must be stress-relieved when dismantling parts in the arm system.

CAUTION

Be sure to follow the ESD guidelines. 

General

This instruction shows how to replace the lower arm link and the arm supports. Fig. 1 shows the lower arm link and Fig. 2 shows the arm support.

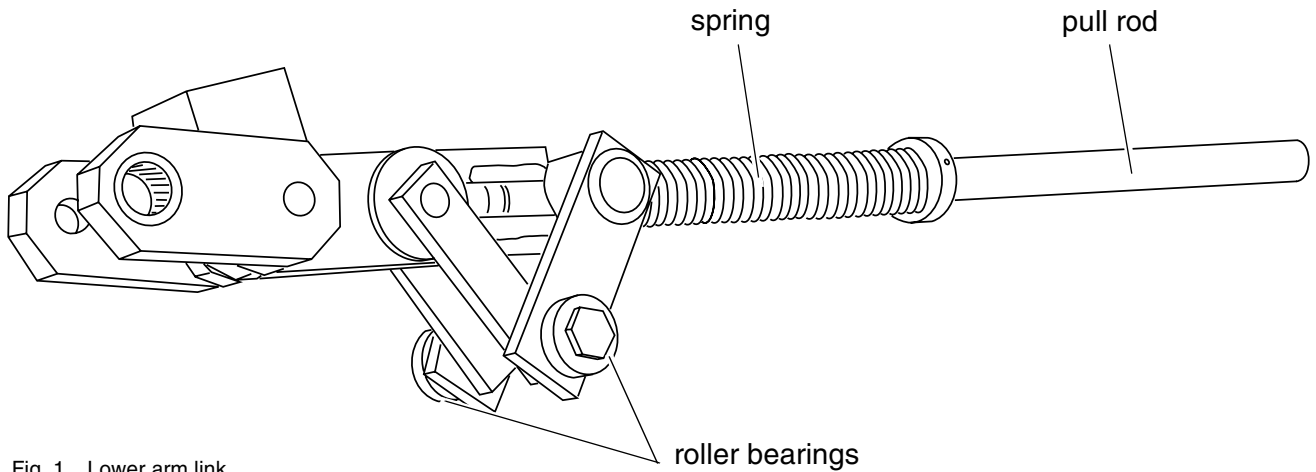


Fig. 1 Lower arm link

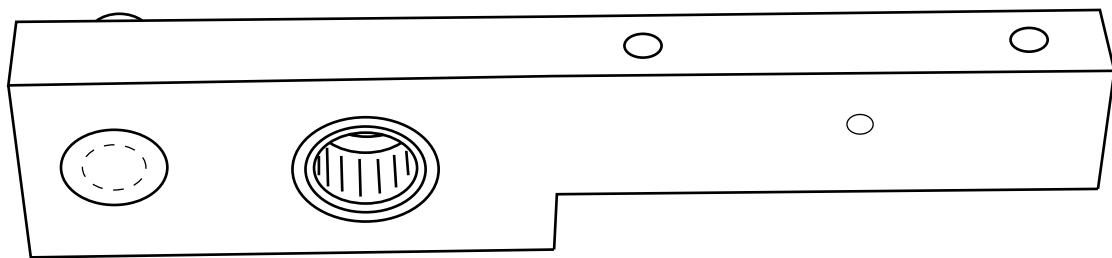


Fig. 2 Arm support

NOTICE

This procedure is quite complicated. Remember how cables, covers and screws etc. are mounted to make the reassembly easier.

Preparatory work

1. System OFF. If MOBILETT Plus HP, switch to "C".
2. Disconnect the mains/supply cable.
3. Remove the system upper cover (pos. 1 / Fig. 3). If MOBILETT Plus M/ -HP, disconnect K106.
4. Switch S10 to discharge position.
5. After approximately 5 minutes the capacitor bank will be discharged. Remove the side covers and the cover with the cassette compartment (pos. 2 / Fig. 3).
6. For MOBILETT Plus HP only: Remove the cover in front of the batteries. Disconnect one of the blue battery connector pairs.
- 7.

**WARNING**

Follow the safety procedures described in the document Service Instructions for detailed instructions on how to make sure the capacitor bank is discharged.

8. Remove the upper and lower arm cover (pos. 3 / Fig. 3).

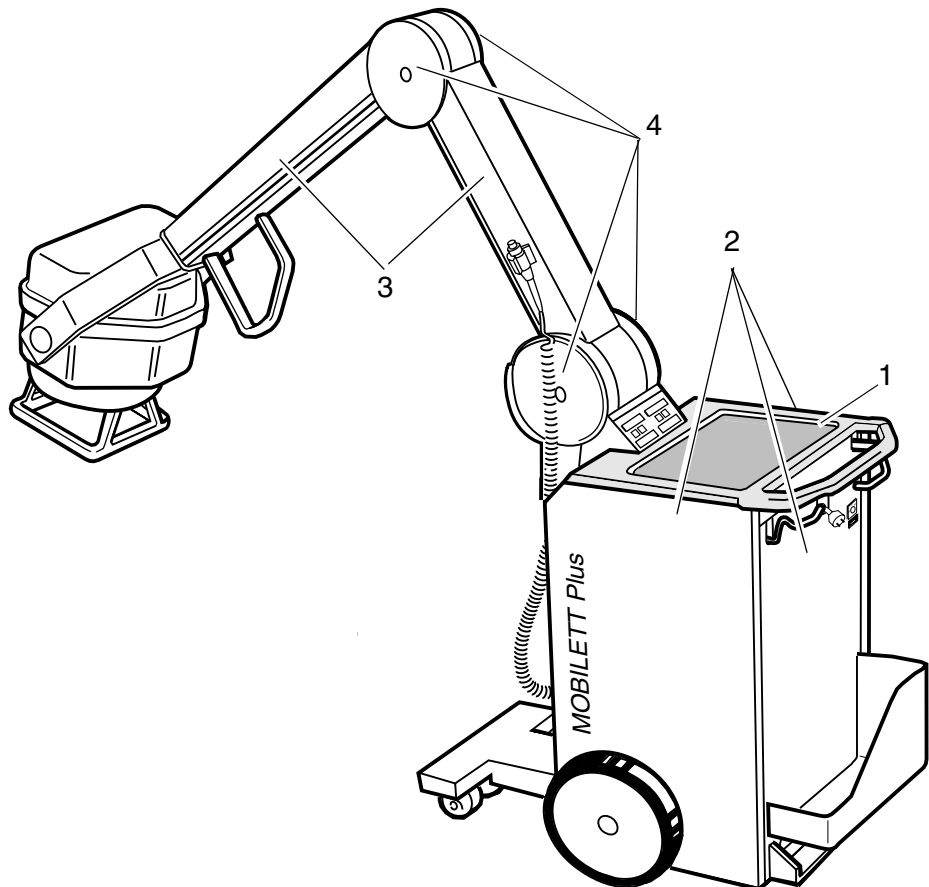


Fig. 3 Removal of covers

NOTICE

For MOBILETT:s with remote exposure switch system installed:

Carefully remove the lower arm cover and leave it hanging by the side.

9. Remove the circular covers (pos. 4 / Fig. 3) and disconnect the three ground connections.
10. Remove the protective cover on top of the D1 board.

Dismounting

1. Remove the transport safeguard (pos. 1 / Fig. 4).

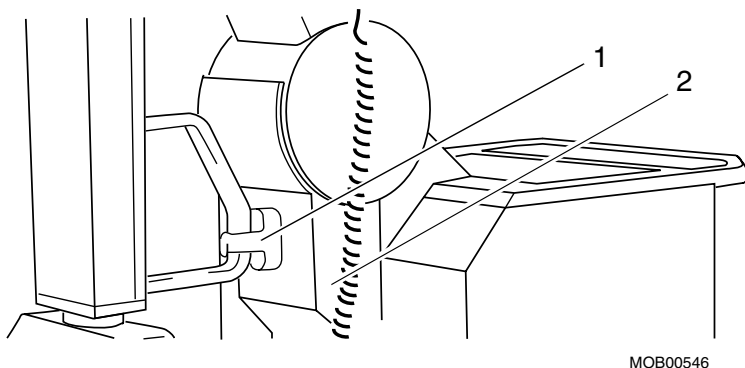


Fig. 4 Transport safeguard

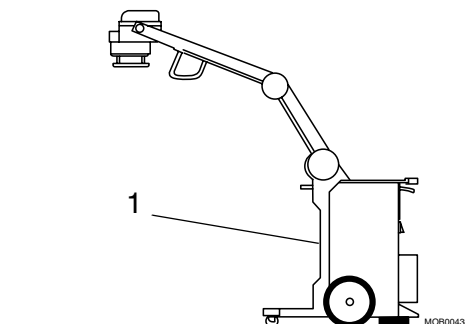


Fig. 5 Front cover

2. If MOBILETT Plus/ Plus M/ Plus HP, disconnect the cable for the turn plate (K1) from board D1.
3. Remove the cover of the articulated shaft (pos. 2 / Fig. 4).
4. Remove the front cover (pos. 1 / Fig. 5).

Depending on the type and the serial no., the MOBILETT has a new or an old chassis:

Chassis	MOBILETT	Serial no.
New chassis	Plus	≥ 2800
	Plus E	≥ 10600
	Plus HP	All
Old chassis	Plus	< 2800
	Plus E	< 10600
	Plus M	All

NOTICE

Steps 5. and 6. for MOBILETT with new chassis only.

5. Raise the single tank to a position where both locking nuts (pos. 1 / Fig. 6) can be alternatingly reached through the punched holes of the chassis.

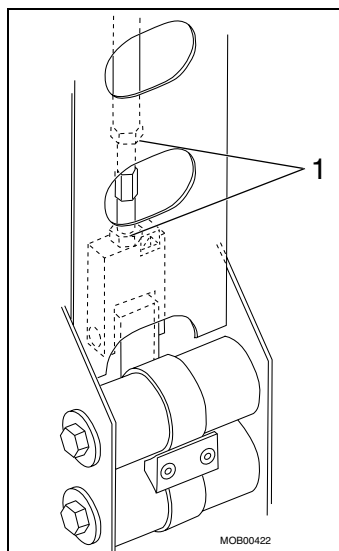


Fig. 6 Locking nuts

6. Loosen the locking nuts slightly (the lower nut has a left hand thread).

NOTICE

Steps 7. to 11. for MOBILETT with old chassis only.

7. Measure the voltage between the + and - bars. The voltage must be less than 10 V (Fig. 7 - Plus/ Plus M), (Fig. 8 - Plus E).

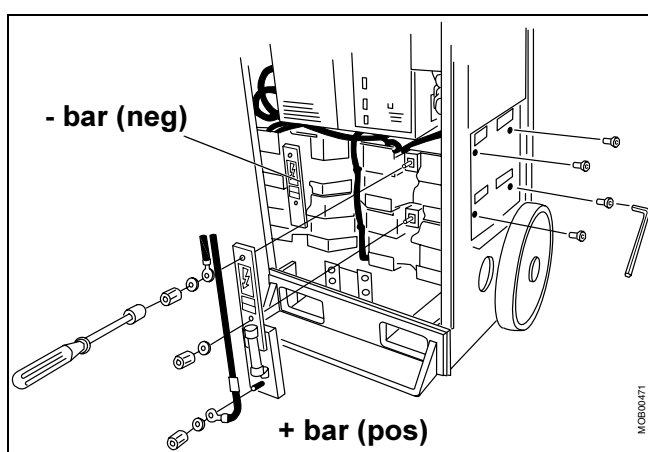


Fig. 7 Removing capacitor bank, Plus/ Plus M

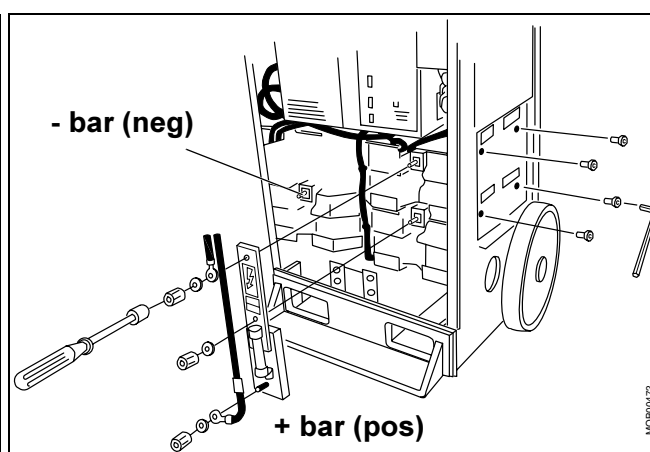


Fig. 8 Removing capacitor bank, Plus E

8. The right (operator's view) capacitor banks shall be removed, therefore mark the cable connections on both sides.

9. Remove the main bars on the patient's side (Fig. 9) and the operator's side (Fig. 7 - Plus/ Plus M), (Fig. 8 - Plus E).

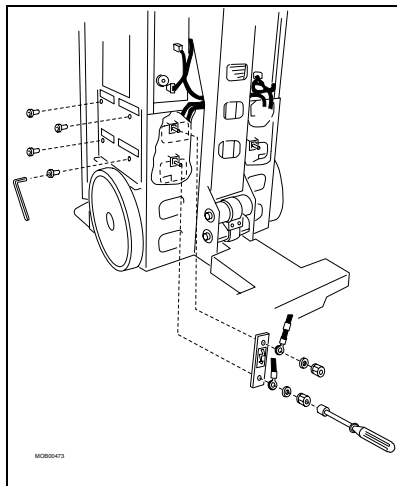


Fig. 9 Removal of main bars

10. Remove the right capacitor banks.

CAUTION

Only use insulated tools when pulling out the capacitor banks.

WARNING

**Do not remove the upper cover of the capacitor banks.
Residual voltage up to 353 VDC may still be present inside.**

11. Loosen the locking nuts slightly (pos. 1 / Fig. 10) (the lower nut has a left hand thread) on adjustment screw **B** (Fig. 10), from the inside of the MOBILETT.

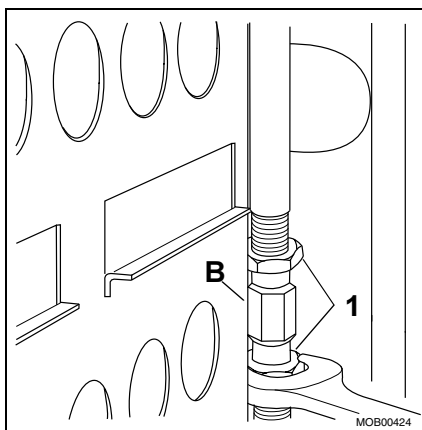


Fig. 10 Locking nuts

12. Remove all cable ties from the upper and lower arm, and from the articulated shaft (pos. 2, 4, 5 and 6 / Fig. 11).

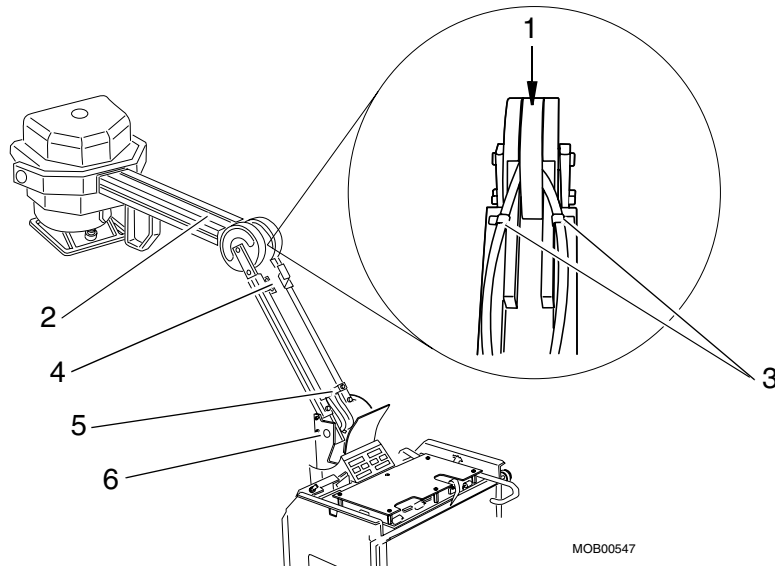


Fig. 11 Central cover of the upper joint

13. Remove the central cover of the upper joint (pos. 1 / Fig. 11) by unscrewing four screws.
14. Slightly loosen the locking nuts of the adjustment rod, the upper one has a left hand thread (pos. 1 / Fig. 12).

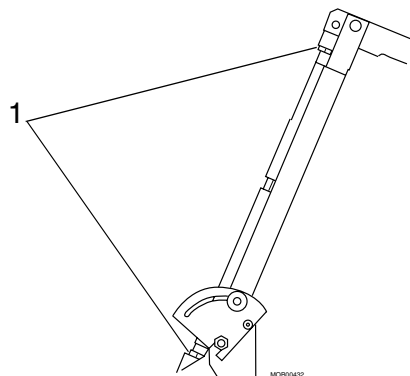


Fig. 12 Adjustment rod, locking nuts

15. Disconnect all cables running in the lower arm joint: K9 from board D1, K60 and K61 from board D4, K64 which is hanging at the side of board D4 and the ground connection on the column cover (Fig. 13).

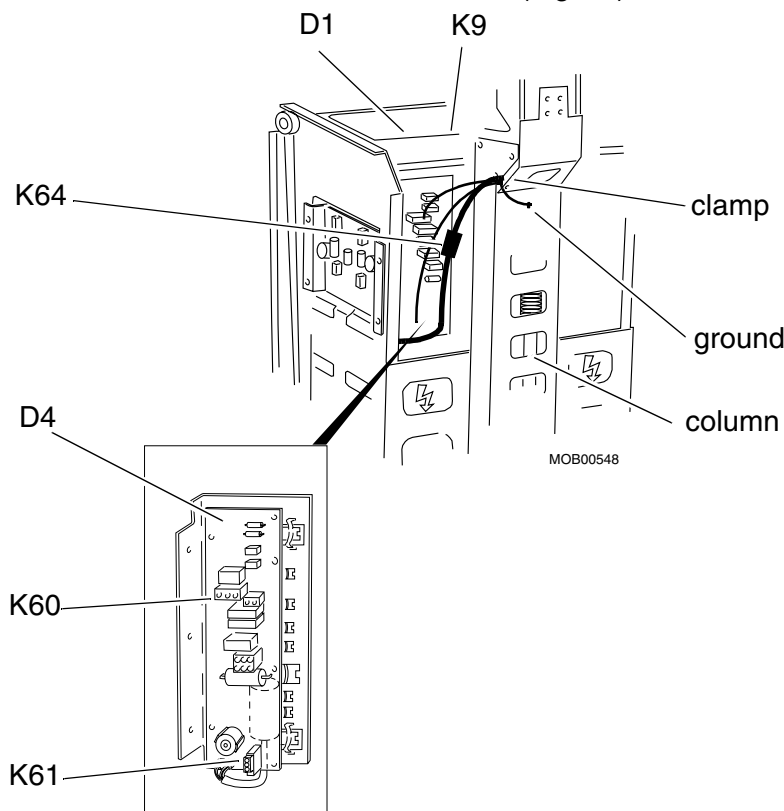


Fig. 13 Cables and connectors

16. Remove the clamp holding the cables (Fig. 13). The clamp is positioned on the inside of the column cover.
17. Loosen the cable clamps on the upper arm (pos. 3 / Fig. 11).
18. Remove the cables in the arm by pulling them out towards the single tank. Especially memorize the way the cables were threaded and fastened in the joint itself. Pull the ground connection shown in Fig. 13 up to the lower arm. Do not remove the ground connection between the upper arm and the lower arm.

19. Loosen the friction lining slightly by turning both screws 360 deg. (pos. 1 / Fig. 14).

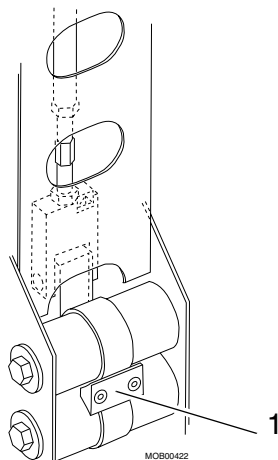


Fig. 14 Friction lining

20. Remove the friction lining in the lower joint (pos. 1 / Fig. 15). The hole in the arm has an internal thread, and the bolt is additionally fastened by a self-securing nut.

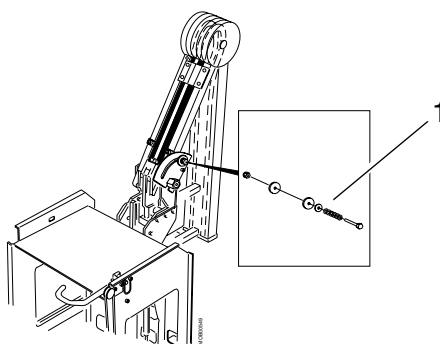


Fig. 15 Friction lining, arm

21. Loosen the rotation limit for the single tank. The rotation limit is loosened by unscrewing the one hexagon socket head cap screw with a 5 mm Allen key (pos. 1 / Fig. 16). To make remounting easier, turn the single tank to one end position. Then mark the angle with a piece of adhesive tape (pos. 2 / Fig. 16).

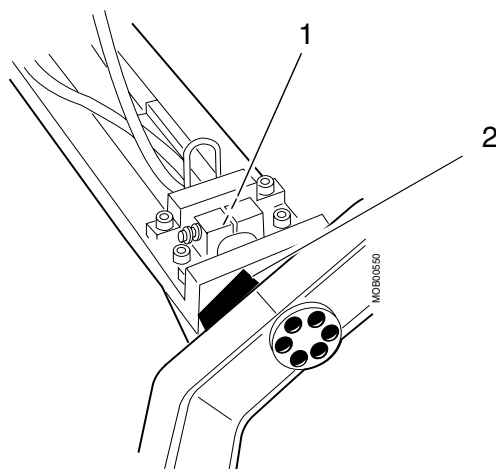


Fig. 16 Rotation limit

22. Position the unit with the single tank resting on a table and put something soft between for protection (Fig. 17). If the arm and single tank does not remain in desired position, loosen the adjustment screw slightly (see step 26.) until the arm and single tank comes to rest on the table.

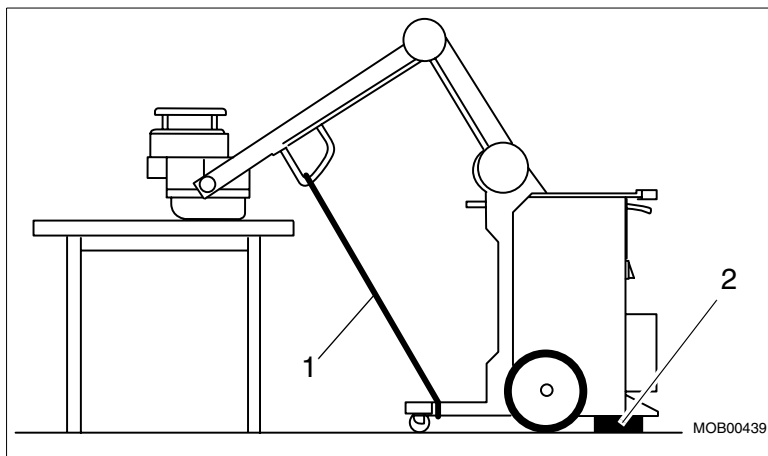


Fig. 17 Single tank positioning

23. Secure the arm with the belts (included in the kit, pos. 1 / Fig. 17).
24. Put a piece of wood (included in the kit, pos. 2 / Fig. 17) under the operator's side of the unit. Make sure the parking brake is applied.
25. For MOBILETT:s with a tilt bar, remove the tilt bar (Fig. 18).

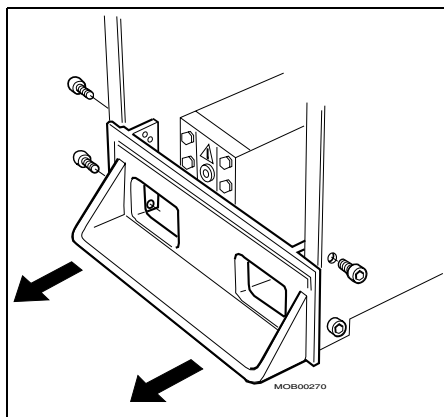


Fig. 18 Tilt bar

26. Loosen adjustment screw **A** (Fig. 19) until it is free but **do not remove it**. This may require several revolutions of the bolt and a considerable torque. On some point, the torque needed will decrease suddenly and sharply. The arm is no longer balanced now.

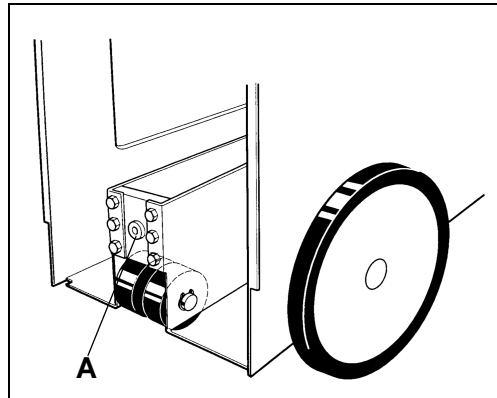


Fig. 19 Adjustment screw

WARNING

Adjustment screw **A** comes loose very quickly. Be aware not to get hurt on sharp edges when unscrewing. The use of a ratchet wrench with a 10 mm Allen key extension may be recommended.

27. Remove the single tank by unscrewing four screws (pos. 1 / Fig. 20).

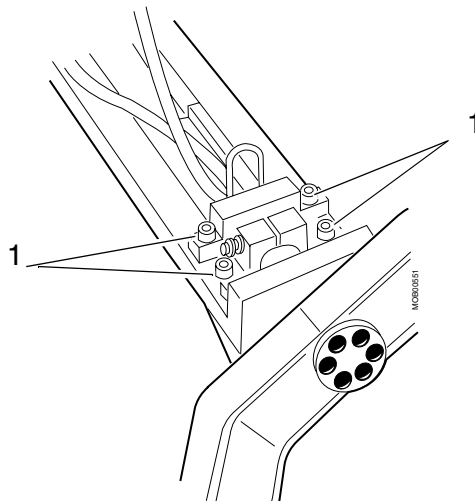


Fig. 20 Removing the single tank

- 28.

NOTICE

This step require two technicians.

Raise the arm to the uppermost position by loosening the belts slowly.

WARNING

A force is pulling the arm upwards and to the operator's side of the MOBILETT.

29. Remove the belts.

30. If needed, loosen the adjustment screw **A** a little more (Fig. 19).

NOTICE

Step 31. for MOBILETT with new chassis only. This step require two technicians.

- 31.

**WARNING**

During this step, one technician must hold the arm, or it could fall down.

Loosen and remove adjustment screw **B** (Fig. 21) from the pull rod.

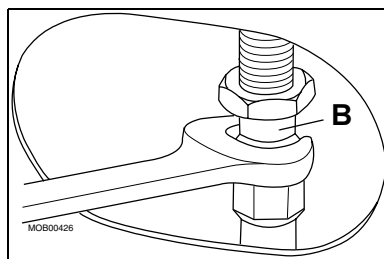


Fig. 21 Removing adjustment screw

NOTICE

Step 32. for MOBILETT with old chassis only. This step require two technicians.

32.

**WARNING**

During this step, one technician must hold the arm, or it could fall down.

Loosen and remove adjustment screw **B** from the pull rod (Fig. 22).

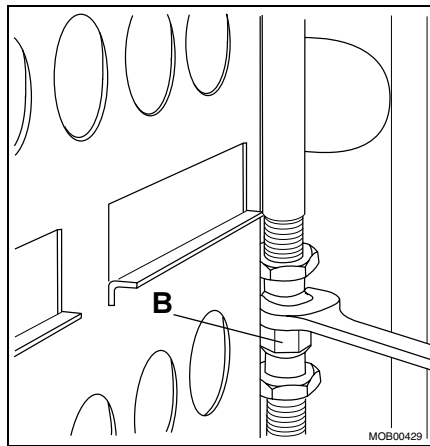


Fig. 22 Removing adjustment screw

33. Remove the shaft (pos. 1 / Fig. 23).

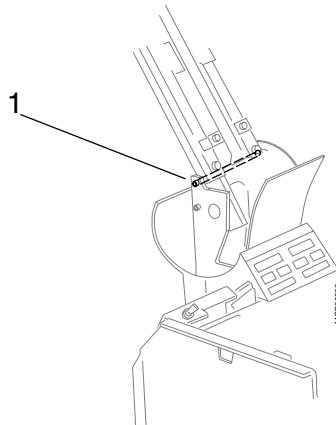


Fig. 23 Removing shaft

34. Remove the adjustment rod by unscrewing it (Fig. 24). Mark the upper and lower end for proper reassembly.

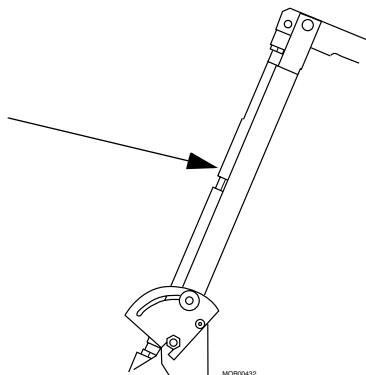


Fig. 24 Adjustment rod

35. Loosen the screw slightly (pos. 2 / Fig. 25) to remove the brake disc (pos. 1 / Fig. 25).

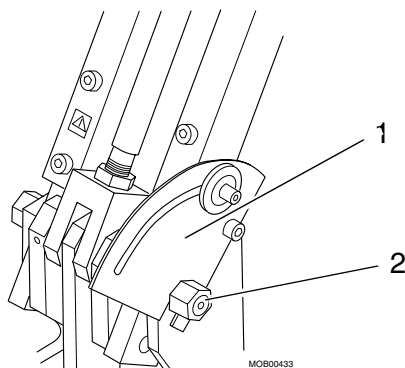


Fig. 25 Brake disc

36. Remove the arm system by unscrewing four screws (pos. 1 / Fig. 26).

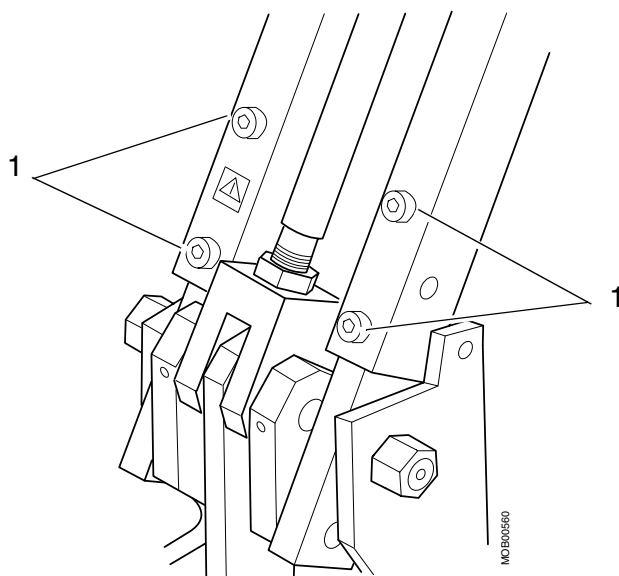


Fig. 26 Removing the arm

37. Disconnect pin plugs K7, K55 and K62 from board D7, see Fig. 27.

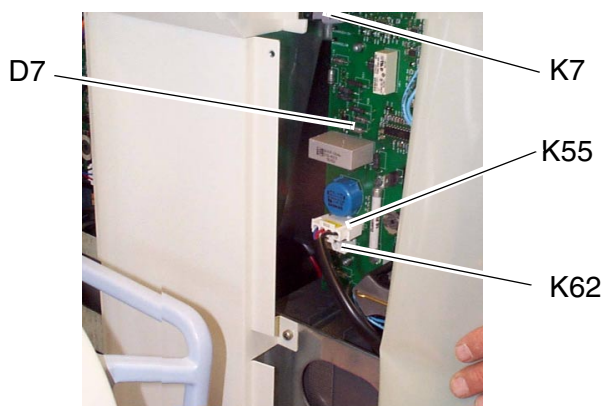


Fig. 27 Board D7

38. Dismount board D7 by unscrewing the three mounting screws, see Fig. 28. If MOBILETT Plus HP, first remove the cover plate in order to reach all mounting screws.

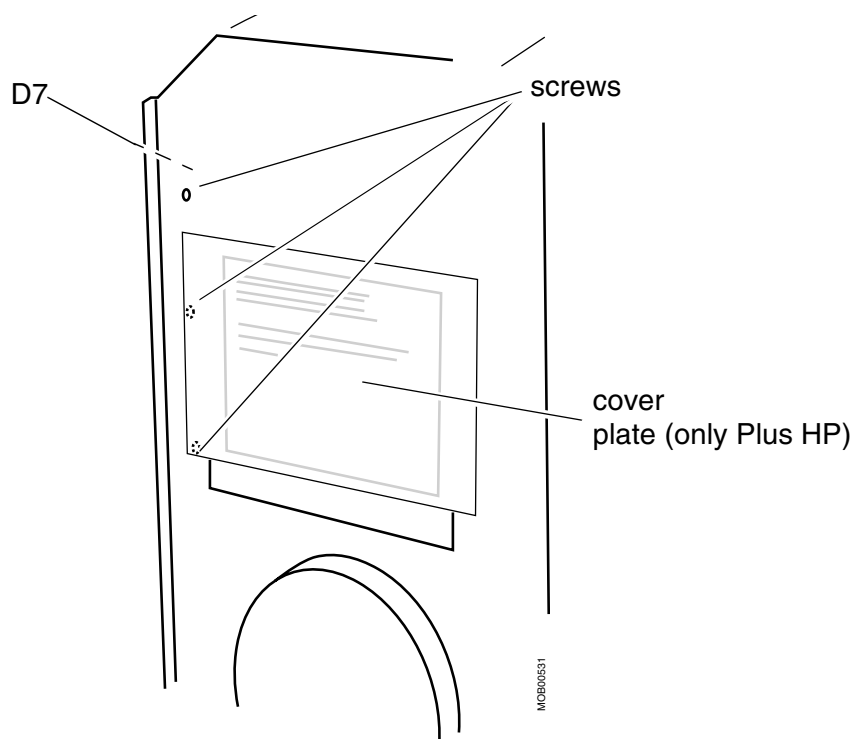


Fig. 28 Removing cover plate and board D7

39. Remove board D7 (Fig. 28).
40. Disconnect the flat conductor cable from board D1 (Fig. 29), pin plug K2. If MOBILETT Plus HP, disconnect K2 also from board D301.

41. Remove the control and display panel by removing 4 screws, see Fig. 29.

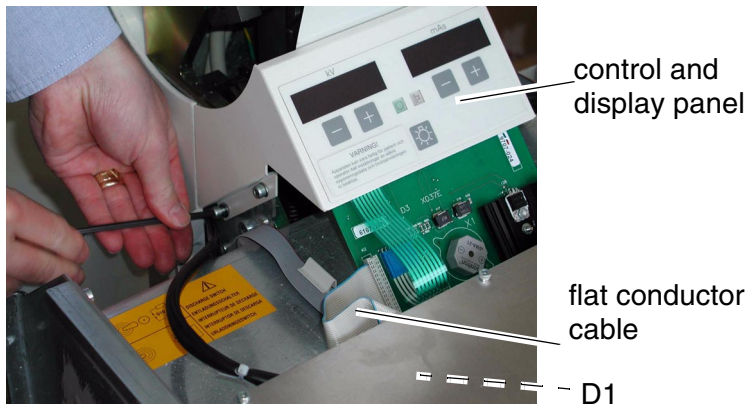


Fig. 29 Removing control and display panel

42. Remove the counter bearings (pos. 1 / Fig. 30) and then the friction lining (pos. 2 / Fig. 30).



The spring pack is unsecured. Be careful when removing the counter bearings.

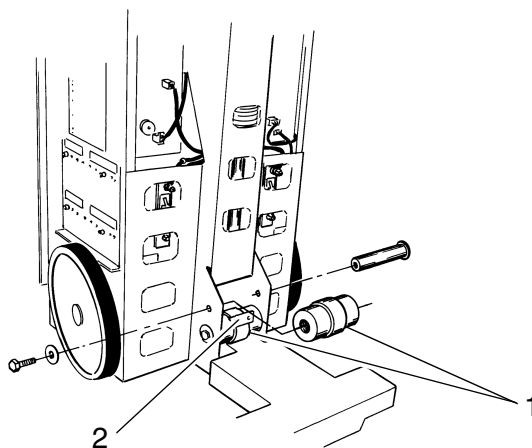


Fig. 30 Counter bearings and friction lining

43. Carefully lift out the curve (pos. 1 / Fig. 31) including fork (pos. 2 / Fig. 31) from the patient's side of the MOBILETT.

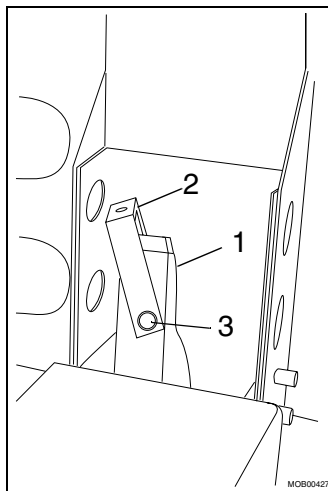


Fig. 31 Curve and fork

44. Loosen the curve from the fork by removing the shaft (pos. 3 / Fig. 31). The shaft is mounted with locking rings which have to be removed in order to remove the shaft.
45. Remove the screw (pos. 1 / Fig. 32) so that the arm support (pos. 2 / Fig. 32) comes loose. There is a spacer-washer in between, keep it safe for reassembly.

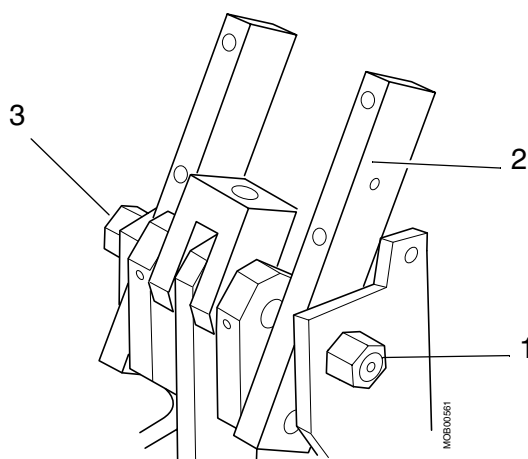


Fig. 32 Removing arm supports

46. Carefully work the arm support free (pos. 2 / Fig. 32), and then remove it.

47. Loosen the other screw (pos. 3 / Fig. 32) so that the other arm support and the lower arm link can be pulled off according to Fig. 33.

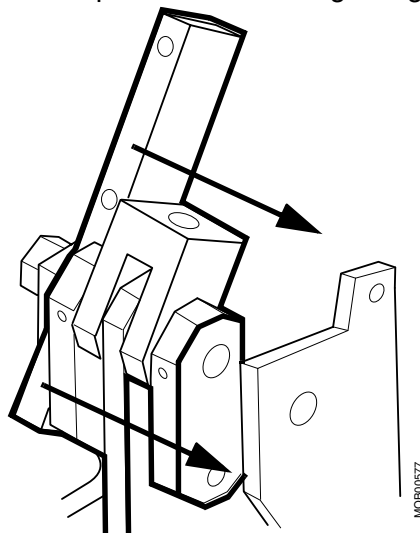


Fig. 33 Removing lower arm link

48. Pull the lower arm link up and out from the column.

Kit mounting

1. Mount the fork and adjustment screw (Fig. 34) on the pull rod of the new lower arm link (Fig. 35). Place both locking nuts 10 mm in on the threads, mark the position with e.g. adhesive tape.

NOTICE

The adjustment screw has to be threaded simultaneously in both fork and pull rod.

When tightening the adjustment screw, both the pull rod and the fork must be fixed to ensure that the adjustment screw threads equally deep into the fork and the pull rod.

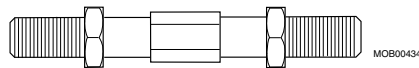


Fig. 34 Adjustment screw

WARNING

Make sure the adjustment screw is mounted as shown in Fig. 35. A minimum of 10 mm of the adjustment screw must be threaded in both the fork and the pull rod. If not, the arm and single tank might fall.

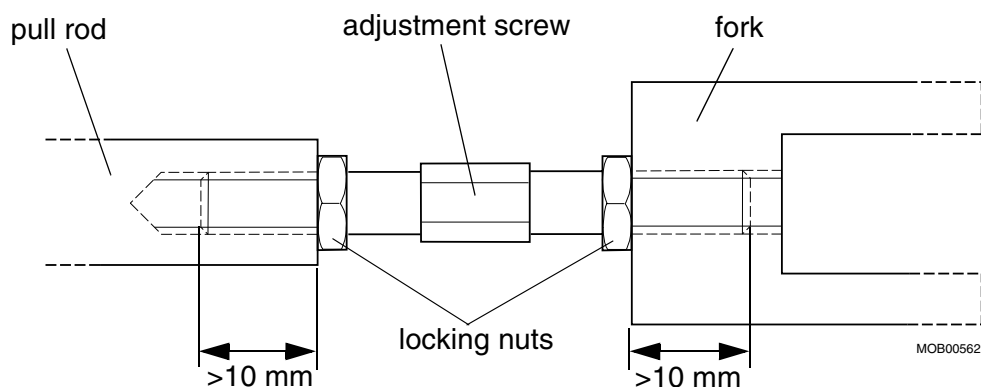


Fig. 35 Mounting of adjustment screw

2. Tighten both locking nuts slightly to prevent movement while mounting.
3. Remove the right arm support (the arm support with a hole for the friction lining (pos. 1 / Fig. 36) from the new lower arm link.

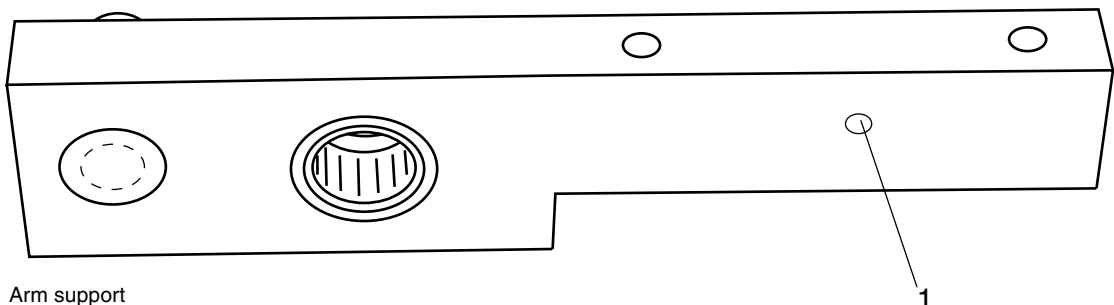


Fig. 36 Arm support

4.

NOTICE**Steps 4. to 7. require two technicians.**

Insert and lower the lower arm link with the left arm support down the column. If the spring pack has moved or slid to the front, carefully push it back into position. Make sure that the roller bearings (Fig. 1) mounted on the pull rod fit into the roller rails on each side of the column (Fig. 37).

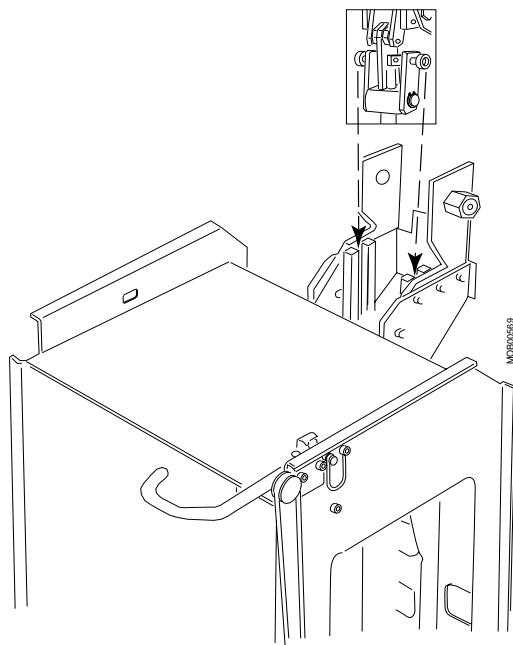


Fig. 37 Positioning roller bearings

5. Carefully fit the left arm support (with lower arm link) on the screw (pos. 1 / Fig. 38).

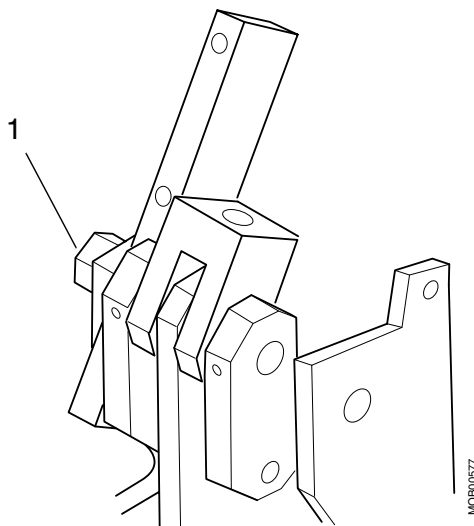


Fig. 38 Mounting lower arm link

6. Attach the new right arm support to the lower arm link by fitting the shaft (pos. 1 / Fig. 39) into the link (pos. 2 / Fig. 39).

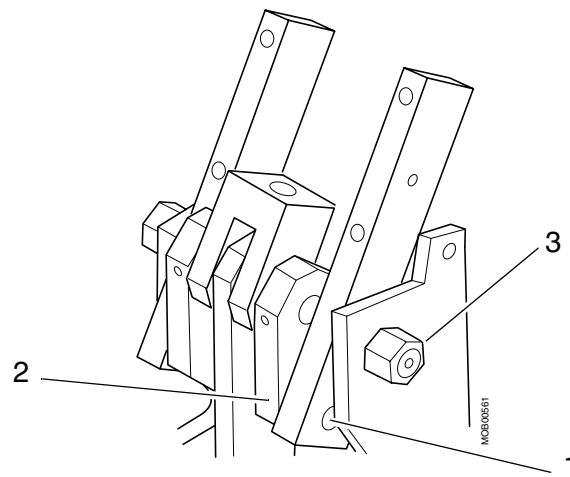


Fig. 39 Mounting arm support

7. Mount the right arm support with the screw (pos. 3 / Fig. 39). Remember to insert the spacer-washer. Remember to leave a small gap for the brake disc (Fig. 25).

Reassembly

1. Remount the curve onto the fork by reversing the procedure described in step 44., Page 2 - 17).

NOTICE

The spring pack is unsecured and may move into the place of the curve. Observe its position, push back the spring pack again if needed when reassembling the curve and the counter bearings.

2. Make sure the roller bearings (Fig. 1) still are in the roller rails in the column.
- 3.

NOTICE

Steps 3. and 4. may require two technicians.

Remount the counter bearings and the friction lining (Fig. 30), begin with the lower bearing. The lower arm link may have to be adjusted (or lengthened, i.e. slightly loosening the adjustment screw) or held by a second technician in such a position that the bearings fit back into place.

4. Remount the arm system (Fig. 26). Use loctite on the screws for proper fastening.
5. Remount the shaft shown in Fig. 23.
6. Remount the friction lining in the lower joint (Fig. 15).
7. Remount the adjustment rod (Fig. 40). The upper arm has to be raised in order for the adjustment rod to fit in the upper joint.

NOTICE

The adjustment rod has to be threaded simultaneously in both the upper joint and the lower joint. Make sure the adjustment rod threads equally deep into both joints!

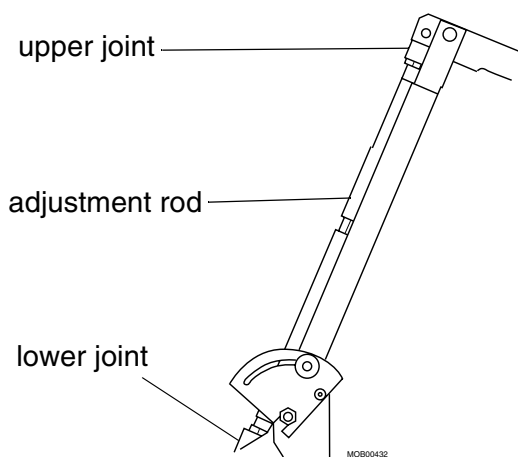


Fig. 40 Adjustment rod

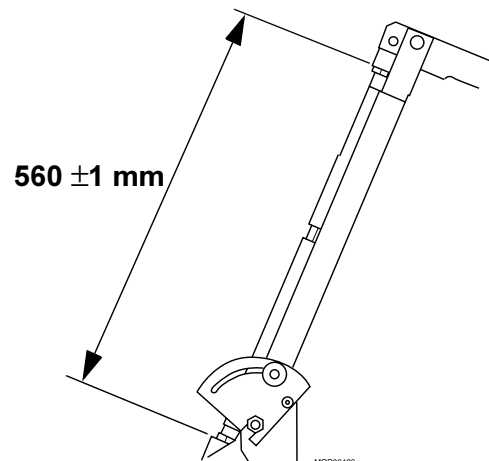


Fig. 41 Correct length

Tighten the adjustment rod until the distance between the joints are $560 \pm 1 \text{ mm}$.

8. Make sure the distance shown in Fig. 42 is always less than 35 mm on both sides of the adjustment rod. Tighten the locking nuts slightly on the adjustment rod.

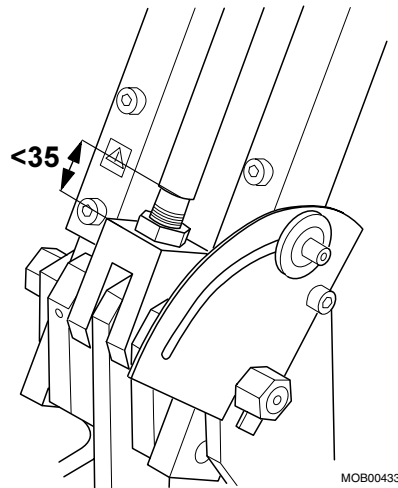


Fig. 42 Minimum distance

⚠ WARNING

The distance shown in Fig. 42 must be less than 35 mm on both sides of the adjustment rod. If the distance is longer than specified, the single tank and the arm might fall.

9.

NOTICE

Remounting the single tank, step 9. to 12., require at least two technicians!

First secure the arm system with belts (Fig. 43).

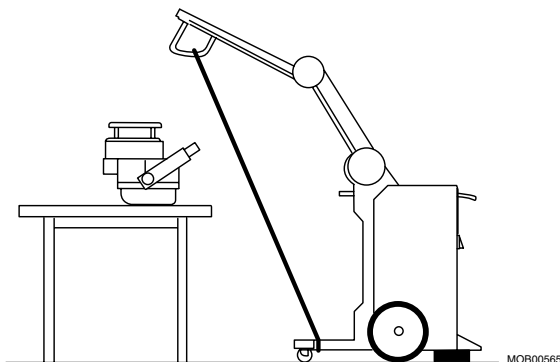


Fig. 43 Securing the arm

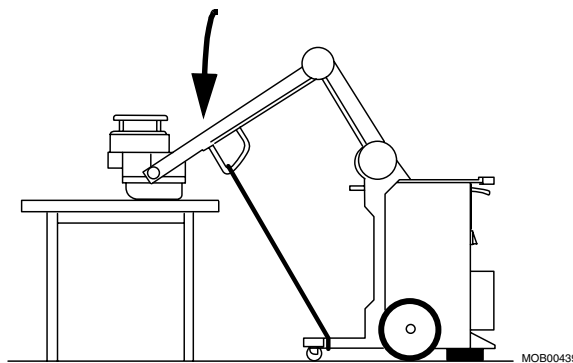


Fig. 44 Remounting the single tank

10. At least one technician presses the arm down while a second technician tightens the belts continuously.

**WARNING**

This requires considerable force! Be careful not to lose grip of the arm.

11. When the correct angle and a suitable position of the upper arm is reached (Fig. 44), secure the belts thoroughly.

**WARNING**

The belts must be tightly secured, or the arm can spring free rapidly and forcefully!

12. Remount the single tank with four screws (Fig. 20). Use loctite on the screws for proper fastening.

13. Tighten the adjustment screw (pos. **A** / Fig. 45) until the arm is balanced. In order to check the balancing, the belts has to be loosened. If the spring pack is not properly in position, a cracking noise can suddenly be heard as the spring pack jumps into position when tightening the screw **A**.

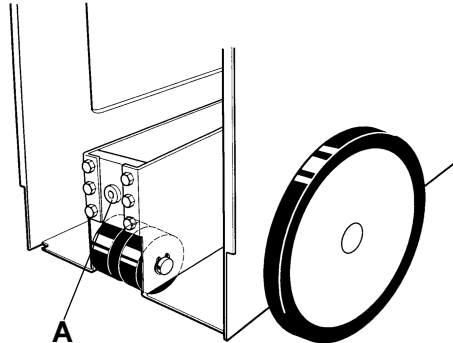


Fig. 45 Adjustment screw

14. Remove the belts.

15. The adjustment rod must always be parallel with the arm. This can be checked by measuring at two points as far away from each other as possible but with the same diameter of the adjustment rod (Fig. 46). The parallelism must not deviate more than 0.6 mm. The measurements must be performed with the arm in the uppermost and lowermost positions. If not parallel, make sure the length (Fig. 41) is correct by adjusting the adjustment rod.

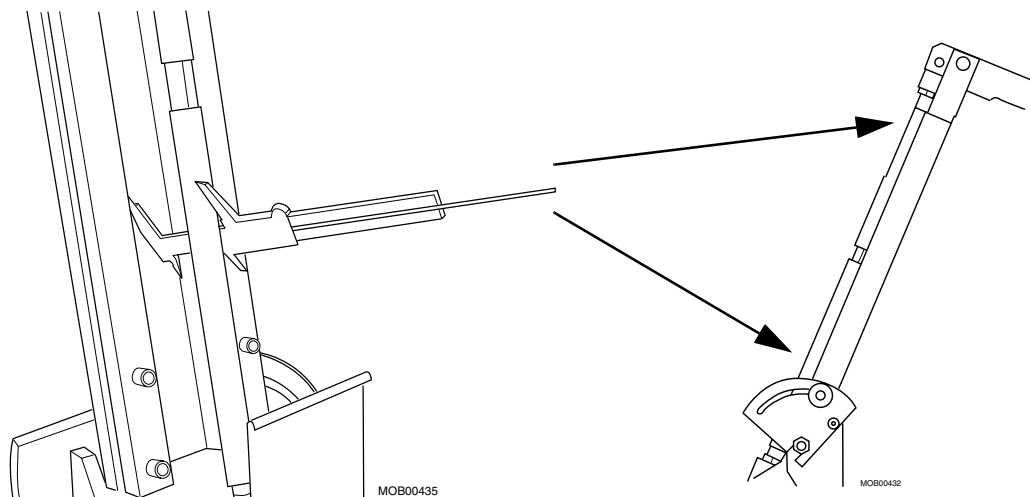


Fig. 46 Measuring parallelism

When the arm and adjustment rod are parallel, finally tighten the locking nuts, also see step 8., Page 2 - 23.



WARNING

Crosscheck the distance shown in Fig. 42. It must be less than 35 mm on both sides of the adjustment rod or the single tank and the arm might fall.

16. **Tighten** the adjustment screw (Fig. 47). When tightening, the distance between the pull rod and the fork decreases. By tightening, the height of the uppermost position of the arm increases.

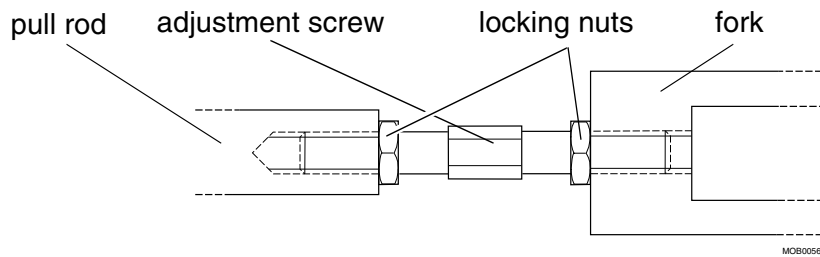


Fig. 47 Adjusting adjustment screw

⚠ WARNING

If the adjustment screw is loosened instead of tightened, the arm and single tank might fall.

Check that the distance shown in Fig. 48 is between 2.10 m and 2.12 m when the arm is in the uppermost position. Measure on both sides of the single tank to make sure it is horizontally aligned.

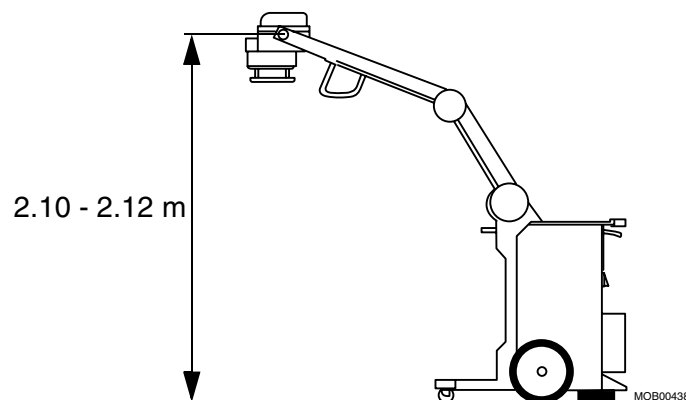


Fig. 48 Adjusting height

17. Tighten the locking nuts on the adjustment screw (Fig. 47).
18. Move the arm back and forth through the whole range to see that it does not jam anywhere in the movement.
19. Remount the display and control panel.
20. Remount board D7.
21. Reconnect K7, K55 and K62 to board D7 (Fig. 27), reconnect K2 to board D1. If MOBILETT Plus HP, reconnect K2 also to board D301 and remount the cover plate (Fig. 28).
22. Thread the cables from the single tank down the arm system according to their position prior to dismounting.
23. Reconnect the ground connection (Fig. 13).

24. Clamp up the cables from the single tank in the clamp (Fig. 49). Make sure the clamp presses over the shielding in the cable.

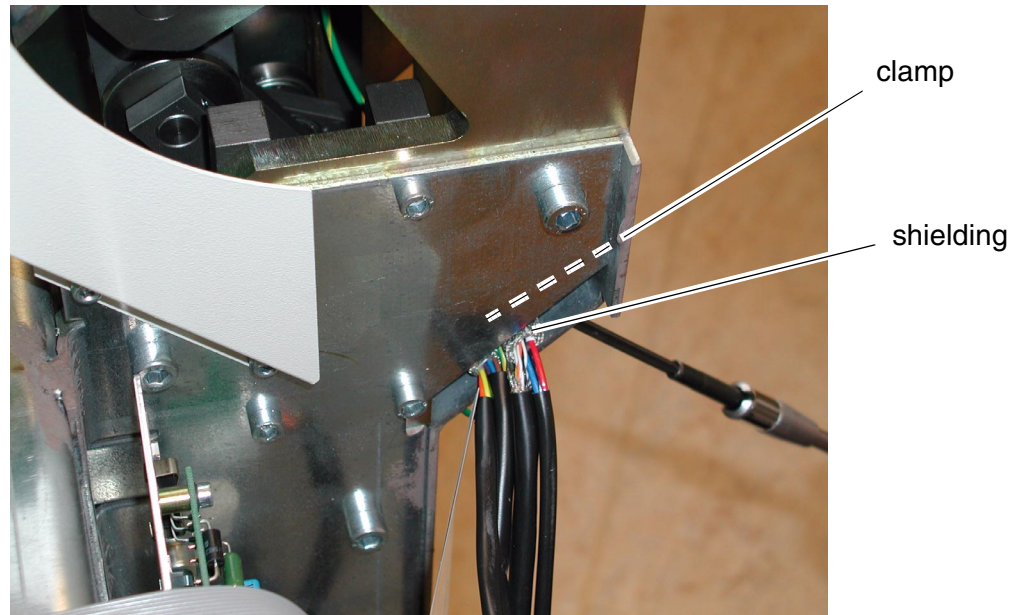


Fig. 49 Remounting clamp

25. Remount the clamps in the upper arm (pos. 3 / Fig. 11).
26. Make sure the ground connection between the upper arm and lower arm runs between the two cables from the single tank in the upper joint. Replace the cable tie in the upper arm to fasten the ground connection (pos. 2 / Fig. 11).
27. Remount the central cover of the upper joint (pos. 1 / Fig. 11). Be careful not to damage the cables.
28. Replace the two cable ties in the lower arm just below the upper joint to fasten the ground connection and the two cables from the single tank (pos. 4 / Fig. 11).
29. Move the arm through the whole range to see that the cables are not stretched.
30. Replace the cable ties in the lower arm and lower joint (pos. 5 and 6 / Fig. 11). Repeat the procedure in step 29.
31. Tighten the screw that limits the rotation of the single tank (Fig. 16). The tape (Fig. 16) marks the angle of one end position, adjust so that the single tank can rotate 165 degrees in both directions (Fig. 50).

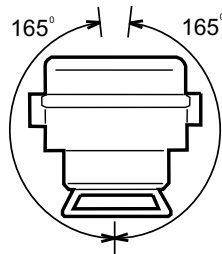


Fig. 50 Rotation range

32. Remount the circular covers on the upper joint.

33. Remount the cover on the upper arm.
34. Adjust the friction linings in the lower joint (Fig. 15), tighten the self-securing nut on the bolt. Also adjust the friction lining between the counter bearings (Fig. 14) for proper arm positioning and movement. The aim is to achieve relatively easy positioning of the arm and single tank and - at the same time - a sure and steady stop in each chosen position.
35. Remount the front cover (Fig. 5).
36. Reconnect K60 and K61 to board D4, reconnect K64 hanging at the side of board D4 and reconnect K9 to board D1 (Fig. 13).
37. Remount the cover of the articulated shaft (pos. 2 / Fig. 4).
38. Remount the protective cover over board D1.
39. For MOBILETT with a tilt bar, remount the tilt bar (Fig. 18).
- 40.

NOTICE

Step 40. for MOBILETT Plus HP only!

Reconnect the batteries, see step 5., Page 2 - 2.

- 41.

NOTICE

Step 41. to 47. for MOBILETT with old chassis only!

CAUTION

Only use insulated tools when handling the capacitor banks.

⚠ WARNING

**Do not remove the upper cover of the capacitor banks.
Residual voltage up to 353 VDC may still be present inside.**

Ensure that the voltage on the electrical contacts of the **removed** capacitor banks does not exceed 2 Volts. (The capacitor banks are discharged with R103).

42. Ensure that the voltage on the electrical contacts of the **remaining** capacitor banks does not exceed 2 Volts. (The capacitor banks are discharged with R103).
43. Reinstall the capacitor banks and main bars, and connect them.
44. Remount the cover with the cassette compartment (pos. 2 / Fig. 3) with one screw near the mains cable.
45. Remount the two side covers.
46. Switch S10 back to operating position.
47. Remount the system upper cover (pos. 1 / Fig. 3). If MOBILETT Plus M/ -HP, reconnect K160.
48. Remount the circular covers on the upper joint.
49. Remount the circular covers with the sliding plate on the lower joint, and reattach the three ground connections. Be careful not to damage the ground cables.
50. Remount the lower arm cover.

Final procedures

1. Mains voltage ON.
2. Release one exposure.
3. Move the arm through the whole range several times and check that the arm is balanced in every position.
4. **Fill in and fax the repair completion form (Appendix A) to SPS-Q, Solna, Sweden.**

Repair completion form

When the replacement of the lower arm link is completed, fill in and fax this form to fax number **+46 8 284180** (Siemens-Elema AB, SPS-Q, Solna, Sweden).

Serial no. of the MOBILETT:	Plus ☐ Plus M ☐ Plus E ☐ Plus HP ☐
Name (CSE):	
Phone (CSE):	
Fax no. (CSE):	
Country:	
Location:	
Customer:	
Site:	
Customer no.:	
Date:	
Signature (CSE):	
Remarks:	

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No changes, initial publication.

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